

CLAIMS

1. A perimeter frame attached to a perimeter of a substrate on one of a perimeter-side and a die-side of the substrate, the perimeter frame arranged to provide an electrical function to the substrate.

5 2. A frame as claimed in claim 1, in which the electrical function being one of ground, power, and capacitance.

3. A frame as claimed in claim 1, the frame being attached in multiple parts.

10 4. A frame as claimed in claim 1, in which the substrate is one of a thick-core, a thin-core, and a coreless substrate in one of a ceramic, a flex, and an integrated circuit printed circuit board (IC-PCB) carrier package.

15 5. A frame as claimed in claim 4, the package being one of a pinned grid array (PGA), and a ball grid array (BGA) carrier package.

6. A frame as claimed in claim 4, the package being one of a flip chip pin grid array (FC-PGA), and a flip chip ball grid array (FC-BGA) carrier package.

7. A frame as claimed in claim 1, the frame substantially made of one of electrically conductive, insulating, and electrically conductive and insulating sections, and formed as one of a molded, stamped, etched, extruded and deposited frame, and is capable of withstanding temperatures of at least normal IC operation.

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8. A frame as claimed in claim 7, the sections further being thermally conductive.

9. A frame as claimed in claim 8, the frame being adapted to at least partially support a heat sink.

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10. A frame as claimed in claim 8, the frame having an integrated cooling structure.

11. A stiffener frame attached to a perimeter of a substrate on one of a perimeter-side and die-side of the substrate, the stiffener providing double electrical function to the substrate.

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12. A frame as claimed in claim 11, in which the double electrical function being ones of ground, power, and capacitance.

13. A frame as claimed in claim 11, the frame being attached in multiple parts.

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14. A frame as claimed in claim 11, the substrate being one of a thin-core, and a coreless substrate of a ceramic, a flex, and an integrated circuit printed circuit board (IC-PCB) carrier package.

5 15. A frame as claimed in claim 14, the package being one of a pinned grid array (PGA), and a ball grid array (BGA) carrier package.

10 16. A frame as claimed in claim 14, the package being one of a flip chip pin grid array (FC-PGA), and a flip chip ball grid array (FC-BGA) carrier package.

15 17. A frame as claimed in claim 11, the frame substantially made of one of electrically conductive, insulating, and mixed electrically conductive and insulating sections, and formed as one of a molded, stamped, etched, extruded and deposited frame, and is capable of withstanding temperatures of at least normal IC operation.

 18. A frame as claimed in claim 17, the sections further being thermally conductive.

 19. A frame as claimed in claim 17, the frame being adapted to at least partially support a heat sink.

20 20. A frame as claimed in claim 17, the frame being having an integrated cooling structure.

21. A carrier package comprising:

one of a thick, a thin-core, and a coreless substrate of one of a ceramic, a flex, and an integrated circuit printed circuit board (IC-PCB) package; and

5 a perimeter frame attached to a perimeter of the substrate on one of a perimeter-side and a die-side of the substrate, the perimeter frame arranged to provide an electrical function to the substrate.

22. A carrier package as claimed in claim 21, in which the electrical function being one of
10 ground, power, and capacitance.

23. A carrier package as claimed in claim 21, the frame being attached in multiple parts.

24. A carrier package as claimed in claim 21, the package being one of a pinned grid array
15 (PGA), and a ball grid array (BGA) carrier package.

25. A carrier package as claimed in claim 21, the package being one of a flip chip pin grid array (FC-PGA), and a flip chip ball grid array (FC-BGA) carrier package.

20 26. A carrier package as claimed in claim 21, the frame substantially made of one of an electrically conductive, insulating, and electrically conductive and insulating sections, and formed as

one of a molded, stamped, etched, extruded and deposited frame, and is capable of withstanding temperatures of at least normal IC operation.

27. A carrier package as claimed in claim 26, the sections further being thermally
5 conductive.

28. A carrier package as claimed in claim 26, the frame being adapted to at least partially support a heat sink.

10 29. A carrier package as claimed in claim 26, the frame having an integrated cooling structure.

30. A carrier package comprising:
one of a thin-core, and a coreless substrate of one of a ceramic, a flex, and an IC-PCB
15 package; and
a stiffener frame attached to a perimeter of the substrate on one of a perimeter-side and die side of the substrate, the stiffener providing double electrical function to the substrate.

31. A carrier package as claimed in claim 30, in which the double electrical function being
20 ones of ground, power, and capacitance.

32. A carrier package as claimed in claim 30, the frame being attached in multiple parts.

33. A carrier package as claimed in claim 30, the package being one of a pinned grid array (PGA), and a ball grid array (BGA) carrier package.

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34. A carrier package as claimed in claim 30, the package being one of a flip chip pin grid array (FC-PGA), and a flip chip ball grid array (FC-BGA) carrier package.

35. A carrier package as claimed in claim 30, the frame substantially made of one of an
10 electrically conductive, insulating, and electrically conductive and insulating sections, and formed as one of a molded, stamped, etched, extruded and deposited frame, and is capable of withstanding temperatures of at least normal IC operation.

36. A carrier package as claimed in claim 35, the sections further being thermally
15 conductive.

37. A carrier package as claimed in claim 35, the frame being adapted to at least partially support a heat sink.

20 38. A carrier package as claimed in claim 35, the frame having an integrated cooling structure.

39. A packaged integrated circuit (IC) comprising:
one of a ceramic, flex, and an integrated circuit printed circuit board (IC-PCB) carrier
package including one of a thick, thin-core, and coreless substrate; and
5 a perimeter frame attached to a perimeter of the substrate on one of a perimeter-side and a
die-side of the substrate, the perimeter frame arranged to provide an electrical function to the
substrate.

40. A packaged IC as claimed in claim 39, in which the electrical function being one of
10 ground, power, and capacitance.

41. A packaged IC as claimed in claim 39, the frame being attached in multiple parts.

42. A packaged IC as claimed in claim 39, the package being one of a pinned grid array
15 (PGA), and a ball grid array (BGA) carrier package.

43. A packaged IC as claimed in claim 39, the package being one of a flip chip pin grid array
(FC-PGA), and a flip chip ball grid array (FC-BGA) carrier package.

20 44. A packaged IC as claimed in claims 39, the frame substantially made of one of an
electrically conductive, insulating, and electrically conductive and insulating sections, and formed as

one of a molded, stamped, etched, extruded and deposited frame, and is capable of withstanding temperatures of at least normal IC operation.

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45. A packaged IC as claimed in claim 44, the sections further being thermally conductive.

46. A packaged IC as claimed in claim 44, the frame being adapted to at least partially support a heat sink.

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47. A packaged IC as claimed in claim 44, the frame having an integrated cooling structure.

48. A packaged integrated circuit (IC) comprising:
one of a ceramic, flex, and an integrated circuit printed circuit board (IC-PCB) carrier
package including one of a thick, thin-core, and coreless substrate; and
a stiffener frame attached to a perimeter of a substrate on one of a perimeter-side and die-
side of the substrate, the stiffener providing double electrical function to the substrate.

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49. A packaged IC as claimed in claim 48, in which the double electrical function being ones of ground, power, and capacitance.

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50. A packaged IC as claimed in claim 48, the frame being attached in multiple parts.

51. A packaged IC as claimed in claim 48, the package being one of a pinned grid array (PGA), and a ball grid array (BGA) carrier package.

52. An packaged IC as claimed in claim 48, the package being one of a flip chip pin grid
5 array (FC-PGA), and a flip chip ball grid array (FC-BGA) carrier package.

53. A packaged IC as claimed in claim 48, the frame substantially made of an electrically
conductive, insulating, and electrically conductive and insulating sections, and formed as one of a
molded, stamped, etched, extruded and deposited frame, and is capable of withstanding
10 temperatures of at least normal IC operation.

54. An packaged IC as claimed in claim 53, the sections further being thermally conductive.

55. A packaged IC as claimed in claim 53, the frame being adapted to at least partially
15 support a heat sink.

56. A packaged IC as claimed in claim 53, the frame having an integrated cooling structure.

57. A method for providing electrical function from a perimeter side of a substrate to a die-
20 side of a substrate, which comprises:

(a) providing external power to perimeter frame attached to perimeter of a substrate,

(b) conducting electrical function from perimeter frame, through perimeter frame-substrate interface, through substrate, through substrate-die interface, to die.

58. A method as claimed in claim 57, where electrical function further comprises one of
5 power and ground.

59. A method as claimed in claim 57, where perimeter frame also provides stiffening support.

10 60. A method for providing power from perimeter side of a substrate to a die-side of a substrate, which comprises:

- (a) providing perimeter frame capacitance attached to perimeter of a substrate,
- (b) conducting power from perimeter frame capacitance, through perimeter frame substrate interface, through substrate, through substrate-die interface, to die.

15 61. A method as claimed in claim 60, where electrical function further comprises one of power and ground

20 62. A method as claimed in claim 60, where perimeter frame capacitance also provides stiffening support.